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CLAIMS - We claim

1. A semiconductor workpiece holder for use in a semiconductor electroplating apparatus used to plate a metal or metals onto a semiconductor workpiece, comprising:

a workpiece support mounted to support a semiconductor workpiece in position with at least a processed surface of the workpiece being in contact with a plating bath;

at least one electrode finger which is electrically conductive and capable of receiving and conducting electrical current therethrough; said at least one electrode finger having an electrode shaft which extends toward a distal end;

a contact part mounted to the distal end of the electrode shaft to provide an electrical contact face which bears upon the semiconductor workpiece during processing to communicate electrical current therethrough.

2. A semiconductor workpiece holder according to claim 1 wherein said contact part is made from a corrosion resistant metal.

3. A semiconductor workpiece holder according to claim 1 wherein said contact part is made from platinum.

4. A semiconductor workpiece holder according to claim 1 wherein said electrode shaft is made from a stainless steel or titanium.

1 5. A semiconductor workpiece holder according to claim 1
2 wherein:

3 said contact part is made from platinum;

4 said electrode shaft is made from a stainless steel or titanium.
5

6 6. A semiconductor workpiece holder according to claim 1 and
7 further comprising a dielectric layer formed about at least the distal end
8 of the electrode shaft and forming a seal against side walls of the
9 contact part to exclude plating liquid from a joint formed between the
10 electrode shaft and the contact part.
11

12 7. A semiconductor workpiece holder according to claim 1 and
13 further comprising a dielectric layer formed from a dielectric plastic
14 material about at least the distal end of the electrode shaft and
15 forming a seal against side walls of the contact part to exclude plating
16 liquid from a joint formed between the electrode shaft and the contact
17 part.
18

19 8. A semiconductor workpiece holder according to claim 1 and
20 further comprising a dielectric layer formed from polyvinylidene fluoride
21 about at least the distal end of the electrode shaft and forming a seal
22 against side walls of the contact part to exclude plating liquid from a
23 joint formed between the electrode shaft and the contact part.
24

1 9. A semiconductor workpiece holder according to claim 1 and
2 further comprising a dielectric layer coated about at least the distal end
3 of the electrode shaft and forming a seal against side walls of the
4 contact part to exclude plating liquid from a joint formed between the
5 electrode shaft and the contact part.

6
7 10. A semiconductor workpiece holder for use in a
8 semiconductor electroplating apparatus used to plate a copper material
9 onto a semiconductor workpiece, comprising:

10 a workpiece support mounted to support a semiconductor
11 workpiece in position with at least a processed surface of the workpiece
12 being in contact with a plating bath;

13 at least one electrode finger which is electrically conductive and
14 capable of receiving and conducting electrical current therethrough; said
15 at least one electrode finger having an electrode shaft which extends
16 toward a distal end;

17 a contact part mounted to the distal end of the electrode shaft
18 to provide an electrical contact face which bears upon the
19 semiconductor workpiece during processing to communicate electrical
20 current therethrough.

21
22 11. A semiconductor workpiece holder according to claim 10
23 wherein said contact part is made from a corrosion resistant metal.
24

12. A semiconductor workpiece holder according to claim 10 wherein said contact part is made from platinum.

13. A semiconductor workpiece holder according to claim 10 and further comprising a dielectric layer formed about the distal end of the electrode shaft and forming a seal against side walls of the contact part to exclude plating liquid from a joint formed between the electrode shaft and the contact part.

14. A semiconductor workpiece holder according to claim 10 and further comprising a dielectric layer formed from a dielectric plastic material about the distal end of the electrode shaft and forming a seal against side walls of the contact part to exclude plating liquid from a joint formed between the electrode shaft and the contact part.

15. A semiconductor workpiece holder according to claim 10 and further comprising a dielectric layer formed from polyvinylidene fluoride about the distal end of the electrode shaft and forming a seal against side walls of the contact part to exclude plating liquid from a joint formed between the electrode shaft and the contact part.

1 16. A semiconductor workpiece holder according to claim 10 and
2 further comprising a dielectric layer coated about the distal end of the
3 electrode shaft and forming a seal against side walls of the contact part
4 to exclude plating liquid from a joint formed between the electrode
5 shaft and the contact part.

6
7 17. A semiconductor workpiece holder for use in a
8 semiconductor electroplating apparatus used to plate a metal or metals
9 onto a semiconductor workpiece, comprising:

10 a workpiece support mounted to support a semiconductor
11 workpiece in position with at least a processed surface of the workpiece
12 being in contact with a plating bath;

13 at least one electrode finger which is electrically conductive and
14 capable of receiving and conducting electrical current therethrough; said
15 at least one electrode finger having an electrode shaft which extends
16 toward a distal end;

17 a contact part mounted to the distal end of the electrode shaft
18 to provide an electrical contact face which bears upon the
19 semiconductor workpiece during processing to communicate electrical
20 current therethrough;

21 a dielectric layer formed about at least the distal end of the
22 electrode shaft and against the contact part to exclude plating liquid
23 from a joint formed between the electrode shaft and the contact part.
24

1 18. A semiconductor workpiece holder according to claim 17, 23
2 wherein said contact part is made from a corrosion resistant metal.
3

4 19. A semiconductor workpiece holder according to claim 17, 23
5 wherein said contact part is made from platinum.
6

7 20. A semiconductor workpiece holder according to claim 17, 23
8 wherein said electrode shaft is made from a stainless steel or titanium.
9

10 21. A semiconductor workpiece holder according to claim 17, 23
11 wherein:

12 said contact part is made from platinum;

13 said electrode shaft is made from a stainless steel or titanium.
14

15 22. A semiconductor workpiece holder according to claim 21 and
16 further comprising a dielectric layer formed about at least the distal end
17 of the electrode shaft and forming a seal against side walls of the
18 contact part to exclude plating liquid from a joint formed between the
19 electrode shaft and the contact part.
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1 23. A semiconductor workpiece holder for use in a
2 semiconductor electroplating apparatus used to plate a metal or metals
3 onto a semiconductor workpiece, comprising:

4 a workpiece support mounted to support a semiconductor
5 workpiece in position with at least a processed surface of the workpiece
6 being in contact with a plating bath;

7 at least one electrode finger which is electrically conductive and
8 capable of receiving and conducting electrical current therethrough; said
9 at least one electrode finger having an electrode shaft which extends
10 toward a distal end;

11 a contact part mounted to the distal end of the electrode shaft
12 to provide an electrical contact face which bears upon the
13 semiconductor workpiece during processing to communicate electrical
14 current therethrough;

15 means forming a dielectric covering about at least the distal end
16 of the electrode shaft and against the contact part to exclude plating
17 liquid from a joint formed between the electrode shaft and the contact
18 part.

1 24. A method for plating metals onto the surface of a
2 semiconductor workpiece, comprising:

3 contacting a surface of the semiconductor workpiece with an
4 electrode assembly; said contacting being performed using a contact face
5 formed upon a contact part, said contact part being mounted to a distal
6 end of an electrode shaft at a contact part joint existing between the
7 electrode shaft and the contact part; said electrode assembly further
8 having a dielectric layer formed about the distal end of the electrode
9 shaft and in sealing relationship against the contact part;

10 submersing a processed surface of the semiconductor workpiece
11 into a plating bath liquid which is used to plate a workpiece plating
12 material onto the processed surface of the semiconductor workpiece;

13 excluding plating bath liquid from the contact part joint using said
14 dielectric layer;

15 electroplating workpiece plating material onto the semiconductor
16 workpiece by passing electrical current through the contact part and
17 between the semiconductor workpiece and the electrode assembly.

18
19 25. A method according to claim 24 wherein said contact face
20 plating layer is formed from said workpiece plating material.

21
22 26. A method according to claim 24 wherein said contact part
23 is made from a noncorrosive metal.
24

1 27. A method according to claim 24 wherein said contact part
2 is made from platinum.

3
4 28. A method for plating copper onto the surface of a
5 semiconductor workpiece, comprising:

6 contacting a surface of the semiconductor workpiece with an
7 electrode assembly; said contacting being performed using a contact face
8 formed upon a contact part, said contact part being mounted to a distal
9 end of an electrode shaft at a contact part joint existing between the
10 electrode shaft and the contact part; said electrode assembly further
11 having a dielectric layer formed about the distal end of the electrode
12 shaft and in sealing relationship against the contact part;

13 submersing a processed surface of the semiconductor workpiece
14 into a plating bath liquid which is used to plate a copper plating
15 material onto the processed surface of the semiconductor workpiece;

16 excluding plating bath liquid from the contact part joint using said
17 dielectric layer;

18 electroplating copper plating material onto the semiconductor
19 workpiece by passing electrical current through the contact part and
20 between the semiconductor workpiece and the electrode assembly.

21
22 29. A method according to claim 28 wherein said contact part
23 is made from a noncorrosive metal.
24

30. A method according to claim 28 wherein said contact part
is made from platinum.

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